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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/762,114	01/21/2004	Peter L. Kellerman	02-IMP-005	3916
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ESCHWEILER & ASSOCIATES, LLC NATIONAL CITY BANK BUILDING 629 EUCLID AVE., SUITE 1210 CLEVELAND, OH 44114			FIORITO, JAMES	
			ART UNIT	PAPER NUMBER
			1763	

DATE MAILED: 02/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/762,114

Applicant(s)

KELLERMAN ET AL.

Examiner

James A. Fiorito

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-64 is/are pending in the application.
- 4a) Of the above claim(s) 2-9, 19-37, 42, 43, 46-53 and 62-64 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 10-17, 38-41, 44, 45 and 54-61 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-64 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/21/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-2, 6, 21-27, 44-46, 50, and 64 are drawn to a chamber, classified in class 118, subclass 715.
- II. Claims 1, 3-5, 44-45, 47-49, drawn to multi-cusp magnetic devices, classified in class 118, subclass 723 MA.
- III. Claims 1, 7-9, 44-45, 51-53 drawn to grounding rods, classified in class 118, subclass 723 AN.
- IV. Claims 1, 10-20, 38-41, 44-45, 54-61, 62-63, drawn to an extraction electrode assembly, classified in class 250, subclass 492.21.
- V. Claims 28-37, and 43, drawn to a method, classified in class 427, subclass 562.

The inventions are distinct, each from the other because of the following reasons:

Inventions I-IV and V are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus can be used to generate other ions than oxygen.

Inventions I-IV are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown

to be separately usable. In the instant case, invention I has separate utility such as a chamber used in other types of apparatus such as ion sources with only a single beam. Invention II has separate utility such as multi-cusp magnetic devices used in plasma etching chambers. Invention III has separate utility such as grounding rods used in other types of apparatus such as ion sources with only a single beam. Invention IV has separate utility such as an extraction assembly used in other types of apparatus such as a mass analyzer. See MPEP § 806.05(d).

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

This application contains claims directed to the following patentably distinct species of the claimed invention:

Species 1 – Embodiment 1, Uniform Plasma Electrode, Claims 1, 10-18, 38-41, and 54-61.

Species 2 – Embodiment 2, Non-uniform Plasma Electrode, Claims 1, 10-20, 38-41, and 54-61. and 62-63

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, claim 19 is generic to species 2.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim

is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

During a telephone conversation with Thomas G. Eschweiler on January 31, 2006 a provisional election was made with traverse to prosecute the invention of Invention IV, Species 1, claims 1, 10-18, 38-41, 44-45, and 54-61. Affirmation of this election must be made by applicant in replying to this Office action. Claims 2-9, 19-37, 42-43, 46-53, and 62-64 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim

remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 44 is rejected under 35 U.S.C. 102(b) as being anticipated by Lob (US 5036252).

With respect to Claim 44: Lob discloses a non-mass analyzed ion implantation system (Fig 1) comprising: a plasma chamber (Fig 1 Item 1 Column 5 Lines 66-68 and Column 6 Lines 1-4) including a plasma source (Fig 1 Item 3 Column 5 Lines 66-68 and Column 6 Lines 1-4) operable to generate source gas ions therein (Fig 1 Item 2 Column 5 Lines 66-68 and Column 6 Lines 1-4); an extraction assembly operable to extract ions from the plasma chamber (Fig 1 Item 6-10 Column 5 Lines 66-68 and Column 6 Lines 1-4); a process chamber (Fig. 5 Item 30 Column 10 Lines 25-28) for receiving the ions extracted from the extraction assembly; and a workpiece support assembly situated in said process chamber (Fig. 5 Item 30 Column 10 Lines 25-28), and operable to secure a workpiece in an orientation for being implanted by the ions extracted. Figure 1 of Lob discloses a substrate and Figure 5 Column 10 Lines 25-28 discloses a vacuum chamber associated with the ion source and extraction assembly. It is reasonable to

conclude that the substrate is at least supported by the bottom of a chamber associated with the ion source and extraction assembly.

Claim 44 is rejected under 35 U.S.C. 102(e) as being anticipated by Leung (US 6888146).

With respect to Claim 44: Lob discloses a non-mass analyzed ion implantation system (Fig 3) comprising: a plasma chamber (Fig. 3 Item 12, Column 2 Lines 49-63) a plasma source (Fig. 3 Item 13, Column 2 Lines 49-63) operable to generate source gas ions therein; an extraction assembly operable to extract ions from the plasma chamber (Fig. 3 Item 16 and 18, Column 2 Lines 49-63); a process chamber (Fig. 9 Item 50, Column 5 Lines 31-39) for receiving the ions extracted from the extraction assembly; and a workpiece support assembly (Fig. 9 Item 30, Column 5 Lines 31-39) situated in said process chamber (Fig. 9 Item 50, Column 5 Lines 31-39), and operable to secure a workpiece in an orientation for being implanted by the ions extracted.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 10-11, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leung (US 6888146) in view of Yamazaki (US 2005/0016462).

With respect to Claim 1: Leung discloses an ion shower, comprising: a plasma source (Fig. 3 Item 13, Column 2 Lines 49-63) operable to generate source gas ions within a chamber (Fig. 3 Item 12, Column 2 Lines 49-63); an extraction assembly associated with a top portion of the chamber (Fig. 3 Item 16, and 18, Column 2 Lines 49-63), and operable to extract ions from the top portion thereof (Fig. 3 Item 19, Column 2 Lines 49-63); and a workpiece support structure associated with the top portion of the chamber (Fig. 3 Item 30, Column 2 Lines 49-63), and operable to secure the workpiece (Fig. 3 Item 28, Column 2 Lines 49-63) and facing the extraction assembly. The top portion of the chamber is considered the portion of the chamber opposing the side connecting the plasma generating antenna.

Leung does not expressly state the workpiece support has an implantation surface orientated facing downward.

Yamazaki discloses a workpiece support that has a surface oriented facing downward (Fig. 1 Item 12, Paragraph 66). Leung and Yamazaki are analogous art because they are from the same field of endeavor namely semiconductor processing systems.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the workpiece support of Leung including the workpiece support has an implantation surface orientated facing downward in view of the teaching of

Yamazaki. The suggestion or motivation for doing so would have been to suppress the attachment of dust (Paragraph 66).

With respect to Claim 10: Leung discloses that the extraction assembly comprises a plurality of extraction electrodes (Fig. 3 Item 16 and 18, Column 2 Lines 49-63) vertically oriented with respect to one another and operable to extract the ions vertically from the top portion of the chamber (Fig. 3 Item 19, Column 2 Lines 49-63).

With respect to Claim 11: Leung discloses a first extraction electrode (Fig. 3 Item 16, Column 2 Lines 49-63) of the plurality of extraction electrodes is closest to the plasma within the chamber and comprises a plurality of extraction apertures extending therethrough (Fig. 3 Item 16, Column 2 Lines 49-63).

With respect to claim 15: Leung discloses that the extraction apertures of the first extraction electrode each have an area (Fig. 4A Item 16 and 18), and wherein extraction apertures of the other extraction electrodes are substantially aligned with the first extraction electrode extraction apertures, respectively (Fig. 4A Item 16 and 18, Column 3 Lines 64-65).

Claims 1, 10-13, 15, 45, 54-56, and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lob (US 5036252) in view of Yamazaki (US 2005/0016462).

With respect to Claim 1: Lob discloses an ion shower, comprising: a plasma source (Fig 1 Item 3 Column 5 Lines 66-68 and Column 6 Lines 1-4) operable to generate source gas ions within a chamber (Fig 1 Item 1 Column 5 Lines 66-68 and

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Column 6 Lines 1-4); an extraction assembly associated with a top portion of the chamber (Fig 1 Item 1 Column 5 Lines 66-68 and Column 6 Lines 1-4), and operable to extract ions from the top portion thereof (Fig 1 Item 6-10 Column 5 Lines 66-68 and Column 6 Lines 1-4); and a workpiece support structure associated with the top portion of the chamber (Fig 1 Item substrate Column 5 Lines 66-68 and Column 6 Lines 1-4), and operable to secure the workpiece (Fig 1 Item substrate Column 5 Lines 66-68 and Column 6 Lines 1-4) and facing the extraction assembly. The top portion of the chamber is considered the portion of the chamber opposing the side connecting the plasma generating antenna.

Lob does not expressly state the workpiece support has an implantation surface orientated facing downward.

Yamazaki discloses a workpiece support that has a surface oriented facing downward (Fig. 1 Item 12, Paragraph 66). Lob and Yamazaki are analogous art because they are from the same field of endeavor namely semiconductor processing systems.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the workpiece support of Lob including the workpiece support has an implantation surface orientated facing downward in view of the teaching of Yamazaki. The suggestion or motivation for doing so would have been to suppress the attachment of dust (Paragraph 66).

With respect to Claim 10: Lob discloses that the extraction assembly comprises a plurality of extraction electrodes (Fig 1 Item 6-10 Column 5 Lines 66-68 and Column 6

Lines 1-4) vertically oriented with respect to one another and operable to extract the ions vertically from the top portion of the chamber (Fig 1 Item 6-10 Column 5 Lines 66-68 and Column 6 Lines 1-4).

With respect to Claim 11: Lob discloses a first extraction electrode (Fig 1 Item 6-10 Column 5 Lines 66-68 and Column 6 Lines 1-4) of the plurality of extraction electrodes is closest to the plasma within the chamber and comprises a plurality of extraction apertures extending therethrough (Fig 1 Item 6 Column 5 Lines 66-68 and Column 6 Lines 1-4).

With respect to claim 12: Lob discloses that the plurality of extraction apertures extends through the first extraction electrode (Fig 1 Item 6-10 Column 5 Lines 66-68 and Column 6 Lines 1-4) collectively have an area associated therewith and wherein a ratio of the area to the total area exposed to plasma defines a transparency, and wherein the transparency is less than 50% (Column 9 Lines 60-68).

With respect to Claim 13: Lob discloses the transparency of the first extraction electrode is about 10% (Column 9 Lines 60-68).

With respect to claim 15: Lob discloses that the extraction apertures of the first extraction electrode each have an area (Fig 1 Item 6 Column 9 Lines 50-57), and wherein extraction apertures of the other extraction electrodes are substantially aligned with the first extraction electrode extraction apertures, respectively (Fig 1 Item 6 Column 9 Lines 50-57).

With respect to Claim 45: Lob discloses a system in accordance with 44, wherein the extraction assembly is associated with a top portion of the plasma chamber

(Fig 1 Item 1 Column 5 Lines 66-68 and Column 6 Lines 1-4), and is operable to extract ions from the top portion thereof, and wherein the workpiece support assembly is operable to secure the workpiece (Fig 1 Item substrate Column 5 Lines 66-68 and Column 6 Lines 1-4).

Lob does not expressly state that the workpiece has an implantation surface orientated facing downward toward the extraction assembly for implantation thereof.

Yamazaki discloses a workpiece support that has a surface oriented facing downward (Fig. 1 Item 12, Paragraph 66). Lob and Yamazaki are analogous art because they are from the same field of endeavor namely semiconductor processing systems.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the workpiece support of Lob including the workpiece support has an implantation surface orientated facing downward in view of the teaching of Yamazaki. The suggestion or motivation for doing so would have been to suppress the attachment of dust (Paragraph 66).

With respect to Claim 54: Lob discloses that the extraction assembly comprises a plurality of extraction electrodes vertically oriented with respect to one another and operable to extract the ions vertically from the top portion of the plasma chamber (Fig 1 Item 6-10 Column 5 Lines 66-68 and Column 6 Lines 1-4).

With respect to claim 55: Lob discloses wherein a first extraction electrode of the plurality of extraction electrodes (Fig 1 Item 6-10 Column 5 Lines 66-68 and Column 6 Lines 1-4) is closest to the plasma within the chamber and comprises a plurality of

extraction apertures extending therethrough (Fig 1 Item 6 Column 5 Lines 66-68 and Column 6 Lines 1-4).

With respect to claim 56: Lob discloses that the plurality of extraction apertures extending through the first extraction electrode collectively have an area associated therewith and wherein a ratio of the area to the total area exposed to plasma defines a transparency, and wherein the transparency is less than 50% (Column 9 Lines 60-68).

With respect to Claim 58: Lob discloses that the extraction apertures of the first extraction electrode each have an area, and wherein extraction apertures of the other extraction electrodes are substantially aligned with the first extraction electrode extraction apertures, respectively (Column 9 Lines 50-59).

Claims 14 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lob (US 5036252) in view of Yamazaki (US 2005/0016462) as applied to claims 1, 10-13, 15, 45, 54-56, and 58 above, and further in view of Katzschnner (US 4987346).

With respect to Claim 14 and 57: Lob in view of Yamazaki discloses an ion shower in accordance with claim 12 and 56.

Lob in view of Yamazaki does not expressly state that the first extraction electrode further comprises cooling passages therein, and wherein a cooling fluid flowing therethrough is operable to cool the first extraction electrode during extraction of ions from the chamber.

Katzschner discloses an extraction electrode (Fig 2 Item 38 Column 6 Line 50-63) wherein the first extraction electrode further comprises cooling passages (Fig 2 Item 44 Column 6 Line 50-63) therein, and wherein a cooling fluid flowing therethrough is operable to cool the first extraction electrode during extraction of ions (Column 6 Line 50-63). Lob in view of Yamazaki and Katzschner are analogous art because they are from the same field of endeavor namely, semiconductor processing systems.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the extraction assembly of Lob in view of Yamazaki including the first extraction electrode further comprises cooling passages therein, and wherein a cooling fluid flowing therethrough is operable to cool the first extraction electrode during extraction of ions from the chamber in view of the teaching of Katzschner. The suggestion or motivation for doing so would have been to cool the extraction electrode (Column 6 Lines 50-63).

Claim 16 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lob (US 5036252) in view of Yamazaki (US 2005/0016462) as applied to claims 1, 10-13, 15, 45, 54-56, and 58 above, and further in view of Leung (US 5563418).

With respect to Claim 16 and 59: Lob in view of Yamazaki discloses an ion shower in accordance with claim 15 and 58.

Lob in view of Yamazaki does not expressly state that the extraction apertures of the other extraction electrodes have respective areas that are greater than the area of the first extraction electrode apertures.

Lob in view of Yamazaki discloses an extraction assembly wherein the extraction aperture of the other extraction electrodes has a respective area that is greater than the area of the first extraction electrode aperture (Fig 1 Item 18-24 Column 5 Lines 51-67 and Column 5 Lines 1-13). Lob in view of Yamazaki and Leung are analogous art because they are from the same field of endeavor, namely semiconductor processing systems.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the extraction assembly of Lob in view of Yamazaki including the extraction apertures of the other extraction electrodes have respective areas that are greater than the area of the first extraction electrode apertures in view of the teaching of Leung. The suggestion or motivation for doing so would have been to change the shape of the ion beams (Column 5 Lines 51-67 and Column 5 Lines 1-13).

Claims 17-18 and 60-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lob (US 5036252) in view of Yamazaki (US 2005/0016462) as applied to claims 1, 10-13, 15, 45, 54-56, and 58 above, and further in view of Johnson (US 6511577).

With respect to Claim 17 and 60: Lob in view of Yamazaki discloses an ion shower in accordance with claim 11 and 55.

Lob in view of Yamazaki does not expressly state that at least one of the other extraction electrodes further comprise interstitial pumping apertures, wherein the interstitial pumping apertures reduce a pressure near the extraction assembly external to the chamber.

Johnson discloses an electrode that comprises interstitial pumping apertures (Fig 9 Item 80 Column 7 Lines 7-10, and 30-37). Lob in view of Yamazaki and Johnson are analogous art because they are from the same field of endeavor namely semiconductor processing systems.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the extraction assembly of Lob in view of Yamazaki including at least one of the other extraction electrodes further comprise interstitial pumping apertures, wherein the interstitial pumping apertures reduce a pressure near the extraction assembly external to the chamber in view of the teaching of Johnson. The suggestion or motivation for doing so would have been to increase the pumping speed of the extraction assembly (Column 7 Lines 7-10 and Column 7 Lines 30-37).

With respect to Claim 18 and 61: Johnson discloses the interstitial pumping apertures have an area greater than an area of the other apertures of the electrode (Fig 9 Items 80 and 82, Column 7 Lines 7-10 and Lines 30-37). Johnson further teaches that the design of the pumping apertures is dependent on the desired pumping speed (Column 7 Lines 30-37). It is well settled that determination of optimum values of cause

effective variables such as these process parameters is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Claims 38-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lob (US 5036252) in view of Johnson (US 6511577).

With respect to Claim 38: Lob discloses an ion shower, comprising: a plasma source operable to generate oxygen ions within a chamber having a first pressure (Fig 1 Item 1 Column 5 Lines 66-68 and Column 6 Lines 1-4); a workpiece support structure associated with the chamber (Fig 1 Item substrate Column 5 Lines 66-68 and Column 6 Lines 1-4), and operable to secure a workpiece for implantation thereof; and an extraction assembly disposed between the chamber and the workpiece support structure (Fig 1 Item 6-10 Column 5 Lines 66-68 and Column 6 Lines 1-4), the extraction assembly comprising a plurality of electrodes, wherein a first electrode comprises a plasma electrode having a plurality of extraction apertures associated therewith (Fig 1 Item 6 Column 5 Lines 66-68 and Column 6 Lines 1-4), and a second electrode comprises an extraction electrode biased negatively with respect to the chamber and disposed between the plasma electrode and the workpiece support structure (Fig 1 Item 7 Column 7 Lines 26-52), the extraction electrode having a plurality of extraction apertures substantially aligned with respect to the plasma electrode extraction apertures (Fig 1 Item 6 and 7 Column 9 Lines 50-57).

Lob does not expressly state that the extraction electrode comprises one or more interstitial pumping apertures operable to reduce a pressure thereat to a second pressure substantially less than the first pressure.

Johnson discloses an electrode that comprises interstitial pumping apertures (Fig. 9 Item 80 Column 7 Lines 7-10, and 30-37). Lob and Johnson analogous art because they are from the same field of endeavor, namely semiconductor processing systems.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the extraction assembly of Lob including the extraction electrode comprises one or more interstitial pumping apertures operable to reduce a pressure thereat to a second pressure substantially less than the first pressure in view of the teaching of Johnson. The suggestion or motivation for doing so would have been to increase the pumping speed of the gas near the extraction electrode (Column 7 Lines 7-10 and Column 7 Lines 30-37).

With respect to Claim 39: Lob discloses that the extraction assembly further comprises a ground electrode (Fig 1 Item 10 Column 5 Lines 66-68 and Column 6 Lines 1-4) disposed between the extraction electrode (Fig 1 Item 7 Column 5 Lines 66-68 and Column 6 Lines 1-4) and the workpiece support structure (Fig 1 Item Substrate Column 5 Lines 66-68 and Column 6 Lines 1-4), and wherein the ground electrode is biased at a voltage of the workpiece support structure that is biased negatively with respect to the plasma within the chamber (Fig 1 Item 10 Column 7 Lines 26-52).

Lob does not expressly state that the ground electrode comprises a plurality of extraction apertures substantially aligned to the plasma electrode extraction apertures (Fig 1 Item 6 and 10 Column 9 Lines 50-57).

However, Lob discloses that the plasma and extraction electrode comprises one or more interstitial pumping apertures substantially aligned to each other (Fig 1 Item 6 and 7 Column 9 Lines 50-57).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the ground electrode of Lob comprising one or more interstitial pumping apertures in view of the teaching of Lob. The suggestion or motivation for doing so would have been to provide a means for ion beam formation (Column 5 Lines 66-68 and Column 6 Lines 1-4).

Further, Lob does not expressly state that the ground electrode comprises one or more interstitial pumping apertures.

Johnson discloses an electrode that comprises interstitial pumping apertures (Fig. 9 Item 80 Column 7 Lines 7-10, and 30-37). Lob and Johnson analogous art because they are from the same field of endeavor namely semiconductor processing systems.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the extraction assembly of Lob including the ground electrode comprises one or more interstitial pumping apertures in view of the teaching of Johnson. The suggestion or motivation for doing so would have been to increase the pumping speed of the gas near the ground electrode (Column 7 Lines 7-10 and Column 7 Lines

30-37).

With respect to Claim 40: Lob discloses that the extraction assembly further comprising a suppression electrode (Fig 1 Item 9 Column 5 Lines 66-68 and Column 6 Lines 1-4) disposed between the ground electrode (Fig 1 Item 10 Column 5 Lines 66-68 and Column 6 Lines 1-4) and the extraction electrode (Fig 1 Item 7 Column 5 Lines 66-68 and Column 6 Lines 1-4), the suppression electrode biased negatively with respect to the ground electrode, and operable to prevent electrons local to the workpiece support structure from entering the extraction assembly (Fig 1 Item 9 Column 7 Lines 26-52), wherein the suppression electrode comprises a plurality of extraction apertures substantially aligned to the plasma electrode extraction apertures (Fig 1 Item 6 and 9 Column 9 Lines 50-57).

Lob does not expressly state that the suppression electrode comprises a plurality of extraction apertures substantially aligned to the plasma electrode extraction apertures.

However, Lob discloses that that the plasma and extraction electrode comprises one or more interstitial pumping apertures substantially aligned to each other (Fig 1 Item 6 and 7 Column 9 Lines 50-57).

At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the suppression electrode of Lob comprising one or more interstitial pumping apertures in view of the teaching of Lob. The suggestion or motivation for doing so would have been to provide a means for ion beam formation (Column 5 Lines 66-68 and Column 6 Lines 1-4).

Further, Lob does not expressly state that the suppression electrode comprises one or more interstitial pumping apertures.

Johnson discloses an electrode that comprises interstitial pumping apertures (Fig. 9 Item 80 Column 7 Lines 7-10, and 30-37). Lob and Johnson analogous art because they are from the same field of endeavor namely semiconductor processing systems.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to form the extraction assembly of Lob including the suppression electrode comprises one or more interstitial pumping apertures in view of the teaching of Johnson. The suggestion or motivation for doing so would have been to increase the pumping speed of the gas near the suppression electrode (Column 7 Lines 7-10 and Column 7 Lines 30-37).

With respect to Claim 41: Lob discloses that the extraction assembly further comprising an auxiliary electrode (Fig 1 Item 8 Column 5 Lines 66-68 and Column 6 Lines 1-4) disposed between the extraction electrode (Fig 1 Item 7 Column 5 Lines 66-68 and Column 6 Lines 1-4) and the suppression electrode (Fig 1 Item 9 Column 5 Lines 66-68 and Column 6 Lines 1-4), wherein the auxiliary electrode is biased negatively with respect to the extraction electrode and positively with respect to the suppression electrode (Fig 1 Item 8 Column 7 Lines 26-52).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Fiorito whose telephone number is (571)272-7426. The examiner can normally be reached on Standard.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James Fiorito
Patent Examiner
AU 1763

JF


Parviz Hassanzadeh
Supervisory Patent Examiner
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